U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-269 253

False River Lake, Pointe Coupee Parish, Louisiana

National Eutrophication Survey, Corvallis, Oreg

Prepared for

Corvallis Environmental Research Lab, Oreg

Mar 77

PB 269 253

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES

CORVALLIS ENVIRONMENTAL RESEARCH LABORATORY - CORVALLIS, OREGON
and
ENVIRONMENTAL MONITORING & SUPPORT LABORATORY - LAS VEGAS, NEVADA

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE

REPORT

ON

FALSE RIVER LAKE

POINTE COUPEE PARISH

LOUISIANA

EPA REGION VI

WORKING PAPER No. 910

WITH THE COOPERATION OF THE

LOUISIANA WILD LIFE AND FISHERIES COMMISSION

AND THE

LOUISIANA NATIONAL GUARD

MARCH, 1977

1. REPORT NO.	2.
4. TITLE AND SUBTITLE Report on False River Lake, Pointe Coupee Parish, Louisiana	5. REPORT DATE Prepared March 1977 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) Anonymous (National Eutrophication Survey Staff)	8. PERFORMING ORGANIZATION REPORT NO. Working Paper No. 540
9. PERFORMING ORGANIZATION NAME AND ADDRESS National Eutrophication Survey U.S. Environmental Protection Agency P.O. Box 15027 Las Vegas, NV 89114	10. PROJECT/TASK/WORK UNIT NO. 11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS Office of Research and Development U.S. Environmental Protection Agency 401 M Street, S. W. Washington, DC 20460	13. TYPE OF REPORT AND PERIOD COVERED Final - 1974 14. SPONSORING AGENCY CODE
15. SUPPLEMENTARY NOTES Prepared in cooperation with the U.S. Environmental Protection Agency, Corvallis Environmental Research Laboratory, Eutrophication Survey Branch, Corvallis, OR 97330	

16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN-ENDED TERMS	c. COSATI Field/Group
eutrophication lakes nutrients phosphorus nitrogen loading		05B 05C

18. DISTRIBUTION STATEMENT Release unlimited	19. SECURITY CLASS (This Report)	21. NO. OF PAGES 27
	20. SECURITY CLASS (This Page)	22. PRICE

REPORT ON FALSE RIVER LAKE

POINTE COUPEE PARISH, LOUISIANA

EPA REGION VI

by

National Eutrophication Survey

Water and Land Monitoring Branch
Monitoring Applications Laboratory
Environmental Monitoring & Support Laboratory
Las Vegas, Nevada

and

Eutrophication Survey Branch
Corvallis Environmental Research Laboratory
Corvallis, Oregon

Working Paper No. 540

OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY

March 1977

CONTENTS

	Page
Foreword	ii
List of Louisiana Study Lakes	iv
Lake and Drainage Area Map	v
Sections	
I. Introduction	1
II. Conclusions	1
III. Lake Characteristics	3
IV. Lake Water Quality Summary	4
V. Literature Reviewed	10
VI. Appendices	11

FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impacts on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point source discharge reduction and nonpoint source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(a)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,5)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by the U.S. Environmental Protection Agency and to augment plans implementation by the states.

ACKNOWLEDGMENTS

The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Louisiana Wild Life and Fisheries Commission, Division of Water Pollution Control for professional involvement, to the Louisiana National Guard for conducting the tributary sampling phase of the Survey, and to those Louisiana wastewater treatment plant operators who provided effluent samples and flow data.

Robert A. Lafleur, Chief; J. Dale Givens, Assistant Chief; Lewis R. Still, Biologist; Louis Johnson, Biologist; Lee Caubarreaux, Biologist; Darrell Reed, Engineer; Dempsey Alford, Biologist; and Elwood Goodwin, Water Quality Control Technician, all of the Louisiana Wild Life and Fisheries Commission, Division of Water Pollution Control reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper Series.

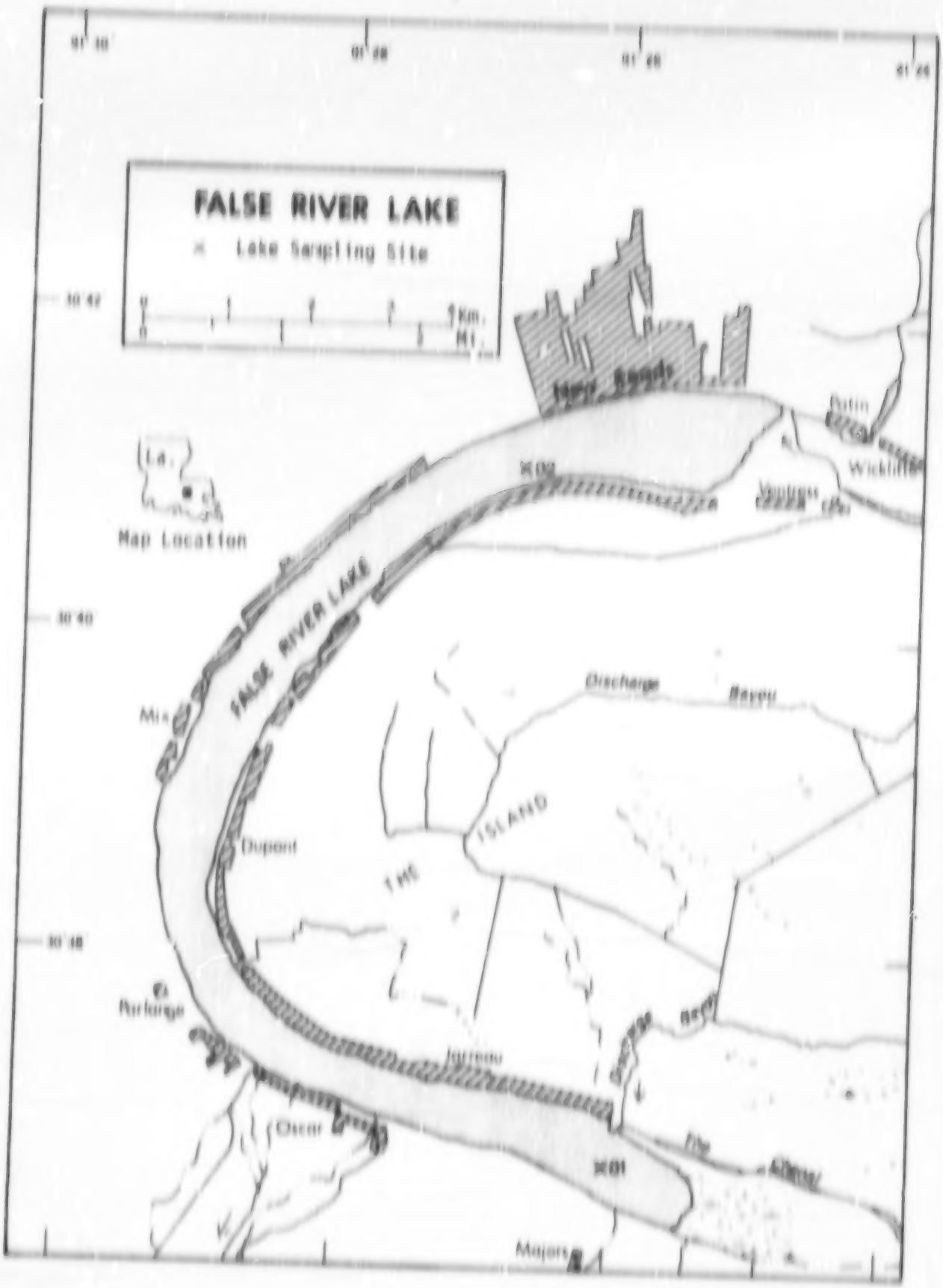
Major General O'Neil Daigle, Jr., the Adjutant General of Louisiana, and Project Officer Colonel Lawrence P. Dupre, who directed the volunteer efforts of the Louisiana National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF LOUISIANA

LAKE NAME	PARISH
Anacoco Lake	Vernon
Lake Bistineau	Bienville, Webster
Black Bayou	Caddo
Black Lake	Natchitoches and Red River
Bruin Lake	Tensas
Bundicks Lake	Beauregard
Caddo Lake	Caddo (Marion and Harrison in Texas)
Cocodrie Lake	Concordia
Cocodrie Lake (Lower)	Rapides
Concordia Lake	Concordia
Cottle Lake	Rapides
Cross Lake	Caddo
D'Arbonne Lake	Union
False River Lake	Pointe Coupee
Indian Creek Reservoir	Rapides
Saline Lake	LaSalle
Turkey Creek Lake	Franklin
Lake Vernon	Vernon
Lake Verret	Assumption


FALSE RIVER LAKE
Lake Sampling Site
Km.
Mi.
Map Location
FALSE RIVER LAKE
Discharge
Bayou
ISLAND
Dupont
Jarreau
Oscar
Major

REPORT ON FALSE RIVER LAKE, LOUISIANA
STORET NO. 2212

I. INTRODUCTION

False River Lake was included in the National Eutrophication Survey (NES) as a water body of interest to the Louisiana Stream Control Commission and Louisiana Wild Life and Fisheries Commission. Tributaries and nutrient sources were not sampled, and this report relates only to the data obtained from lake sampling.

II. CONCLUSIONS

A. Trophic Condition:*

Survey data indicate that False River Lake is eutrophic, i.e., nutrient rich and highly productive. Whether such nutrient enrichment is to be considered beneficial or deleterious is determined by its actual or potential impact upon designated beneficial water uses of each lake.

Chlorophyll *a* values ranged from 14.6 µg/l in the spring to 42.9 µg/l in the summer with a mean of 24.5 µg/l. Potential for primary production as measured by algal assay control yields was high, and severe dissolved oxygen depression was observed during summer sampling at both lake sites. Survey limnologists reported submerged weeds along approximately 15% of the lake shoreline.

*See Appendix C.

scattered patches of water hyacinths and hydrogen sulfide production during summer sampling of Station 02. Other sources (M.B. Watson, personal communication) indicate that False River Lake also experiences massive summer algal blooms and periodic fish kills during prolonged summer stagnation and fall overturn.

B. Rate-Limiting Nutrient:

Spring algal assay results indicate that False River Lake was limited by available nitrogen levels. The lake data indicate nitrogen limitation during all three sampling occasions; inorganic nitrogen to orthophosphorus ratios (N/P) were 10/1 or lower on all occasions. However, the fall assay results do not indicate either phosphorus or nitrogen to be limiting growth at the time of assay sample collection. A low N/P ratio is further supported by the dominance of blue-green algal forms on all three sampling occasions.

III. LAKE CHARACTERISTICS

A. Lake Morphometry:*

A. Surface area: 11.78 km^2.
B. Mean depth: 7.1 meters.
C. Maximum depth: 19.8 meters.
D. Volume: 83.328 x 10^6 m^3.

B. Precipitation:

A. Year of sampling: 174.5 cm.
B. Mean annual: 171.2 cm.

*Provided by the State of Louisiana.

IV. LAKE WATER QUALITY SUMMARY

False River Lake was sampled three times during the open-water season of 1974 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from two stations on the lake and from one or more depths at each station (see map, page v). During each visit, depth-integrated samples were collected from each station for chlorophyll *a* analysis and phytoplankton identification and enumeration. During the first and last visits, 18.9-liter depth-integrated samples were composited for algal assays. Maximum depths sampled were 16.1 meters at Station 01 and 10.7 meters at Station 02. For a more detailed explanation of NES methods, see NES Working Paper No. 175.

The results obtained are presented in full in Appendix B and are summarized in IV-A for waters at the surface and at the maximum depth for each site. Results of the phytoplankton counts and chlorophyll *a* determinations are included in IV-B. Results of the limiting nutrient study are presented in IV-C.

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
03/21/74	1. Aphanizomenon	2,918
	2. Anabaena	1,220
	3. Melosira	594
	4. Flagellates	158
	5. Stephanodiscus	158
	Other genera	158
	Total	10,006
06/29/74	1. Dactyliococcopsis	23,937
	2. Flagellates	2,462
	3. Stephanodiscus	1,515
	4. Nitzschia	1,288
	5. Oscillatoria	985
	Other genera	7,577
	Total	37,764
11/21/74	1. Dactyliococcopsis	3,230
	2. Oscillatoria	2,275
	3. Nitzschia	1,130
	4. Cryptomonas	1,007
	5. Cyclotella	963
	Other genera	1,085
	Total	10,506

2. Chlorophyll A -

Sampling Date	Station Number	Chlorophyll A (ug/l)
03/21/74	01	14.2
	02	14.6
06/29/74	01	39.5
	02	42.9
11/12/74	01	15.3
	02	16.1

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

a. 03/21/74

Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.020	0.066	4.1
0.05 P	0.070	0.066	3.7
0.05 P + 1.0 N	0.070	1.066	20.1
1.00 N	0.020	1.066	6.2

b. 11/12/74

Spike(mg/l)	Ortho P Conc.(mg/l)	Inorganic N Conc.(mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.043	0.368	2.9
0.05 P	0.093	0.368	1.5
0.05 P + 1.0 N	0.093	1.367	1.4
1.00 N	0.043	1.368	2.0

2. Discussion -

The control yields of the assay alga, Selenastrum capricornutum, indicate that the potential for primary productivity was high in False River Lake on both the spring and the autumn sampling dates. In the spring assay, the increase in yield with the addition of nitrogen as well as the lack of increase with the addition of phosphorus indicates nitrogen limitation. Maximum growth response was achieved with the simultaneous addition of both nutrients. However, in the fall assay, a growth response did not accompany the addition of either phosphorus or nitrogen, suggesting some minor nutrient was limiting growth in the lake at that time.

The mean N/P ratios in the lake data were 10/1 or lower on all three sampling occasions, further indicating nitrogen limitation in False River Lake (a mean N/P ratio of 14/1 or greater suggests phosphorus limitation).

It should be noted that significant chemical changes took place in Louisiana lake samples between collection and algal assay. The assay data should be considered in this context and, until such difficulties are resolved, used with caution for any prediction of actual lake conditions. Such chemical changes are likely to alter the assay control yield as well as modifying the N/P ratio.

V. LITERATURE REVIEWED

U.S. Environmental Protection Agency. 1975. National Eutrophication Survey Methods 1971-1976. Working Paper No. 175. National Environmental Research Center, Las Vegas, Nevada, and Pacific Northwest Environmental Research Laboratory, Corvallis, Oregon.

Watson, M.B. 1977. Personal Communication (water quality in False River Lake). Louisiana Wild Life and Fisheries Commission, Division of Water Pollution Control. Baton Rouge, Louisiana.

VI. APPENDICES

APPENDIX A
CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B
PHYSICAL AND CHEMICAL DATA

[illegible]

APPENDIX C

PARAMETRIC RANKINGS OF LAKES SAMPLED BY NES IN 1974

STATE OF LOUISIANA

[illegible] DATA TO BE USED IN [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.432	0.341	495,831	6,781	18,488	0.317
0.457	0.357	472,331	19,291	15,891	0.317
0.341	0.338	456,888	12,433	13,771	0.324
0.764	0.591	451,467	17,829	12,293	0.358
0.737	0.571	474,947	23,447	15,621	0.373
0.746	0.437	474,888	35,388	7,788	0.334
0.537	0.339	442,333	12,856	14,899	0.311
0.576	0.388	484,333	32,951	14,889	0.354
0.457	0.353	475,258	38,396	11,489	0.319
0.439	0.339	486,758	6,886	13,288	0.321
0.382	0.339	442,588	24,356	14,489	0.327
0.431	0.341	496,331	21,467	14,889	0.313
0.339	0.364	455,898	21,333	6,889	0.335
0.376	0.371	477,833	21,467	14,488	0.333
0.343	0.338	445,467	12,829	12,888	0.346
0.739	0.329	438,867	4,488	14,488	0.357
0.477	0.358	456,338	12,733	11,889	0.315
0.339	0.371	478,333	33,478	11,889	0.334
0.364	0.373	483,562	25,225	14,899	0.369

[illegible]	[illegible]
[illegible]	[illegible]
2210	LAKE VIEW
2211	WHITTY LAKE
2212	HAITH LAKE
2213	LAKE PITTOCK
2214	BLACK BIRCH
2215	HAZEL LAKE
2216	CEDAR LAKE
2217	LITTLE LAKE
2218	CONCRETE LAKE
2219	OASIS LAKE
2220	SHARBINE LAKE
2212	SALT POND LAKE
2213	[illegible]
2214	SALINE LAKE
2215	TURKEY CREEK LAKE
2216	LAKE HERBERT
2217	LAKE KENNEDY
2218	BLACK LAKE
2219	[illegible]
4007	CAMAS LAKE

[illegible] OF LAKES WITH HIGHER VALUES COMPARED TO LAKES WITH HIGHER VALUES

LAKE CODE	LAKE NAME	[illegible] TOTAL P	[illegible] INORG N	[illegible] ALGAL SEC	[illegible] CHLOPHA	[illegible] MOD DO	[illegible] 2DOS SECCHI D
[illegible]	[illegible] LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible] LAKE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]